Electronic Version
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Claims

[c1] 1. A method of promoting the healing of a wound disposed in soft tissue and having a physical extent, comprising the steps of:

providing control circuitry to control the application of electrical current through a plurality of electrodes;

applying three or more electrodes to the surface of the soft tissue around and in proximity to the wound, wherein each of the three or more electrodes is connected to the control circuitry;

conducting an electrical current through the three or more electrodes, such that one electrode functions as a current source and one or more of the remaining electrodes functions as a current sink; and

switching the function of acting as a current source and as a current sink among the electrodes.

[c2] 2. The method of claim 1, wherein the step of switching proceeds in a sequence rotationally around the wound.

[c3] 3. The method of claim 1, wherein during the conducting step all remaining electrodes function as current sinks, and one or more of the remaining electrodes is connected to ground through an electrical resistance.

[c4] 4. The method of claim 1, wherein during the conducting step all electrodes functioning as current sinks are placed in series with electrical resistances set in the control circuitry, such that an electrical current flows into the physical extent of the wound.

[c5] 5. The method of claim 4, wherein the control circuitry is capable of measuring the electrical impedance between the electrode functioning as the current source and the one or more electrodes functioning as current sinks, and the measured electrical impedance is used to adjust the electrical resistances.

[c6] 6. The method of claim 1, comprising the further step of applying a distal electrode to soft tissue remote from the proximate physical extent of the wound, wherein the distal electrode is connected to the control circuitry.

[c7] 7. The method of claim 6, wherein the remote soft tissue is on the opposite side of the body as the physical extent of the wound.

[c8] 8. The method of claim 6, wherein the distal electrode functions as a current sink.

[c9] 9. The method of claim 6, wherein the switching is controlled to cause an electrical current to move helically

into the physical extent of the wound.

[c10] 10. The method of claim 1, comprising the further steps of detecting the healing of the wound from electrical impedance measurement, and adjusting the pattern of stimulation as the wound heals to optimize healing.

[c11] 11. The method of claim 1, wherein the control circuitry is capable of measuring an electrical impedance value between the electrode functioning as the current source and the one or more electrodes functioning as current sinks, and further comprising the steps of repeating the applying, conducting, and switching steps in more than one treatment session, measuring an electrical impedance value in each treatment session, storing the measured impedance value, and calculating a healing rate for the wound from one or more stored impedance values.

[c12] 12. The method of claim 1, wherein the electrical current is an AC current.

[c13] 13. The method of claim 1, wherein the electrical current alternates between a pulsital AC current, and a DC current.

[c14] 14. The method of claim 1, wherein during the applying step at least one of the three or more electrodes is ap-

plied within the physical extent of the wound.

[c15] 15. A method for promoting the healing of a wound disposed in soft tissue and having a physical extent, comprising the steps for:

providing three or more electrodes for application of electrical current to the soft tissue;

conducting electrical current through the electrodes;

causing one of the electrodes to function as a current source and one or more of the remaining electrodes to function as a current sink; and

switching the function of acting as a current source and as a current sink among the electrodes.

[c16] 16. A device for promoting the healing of a wound disposed in soft tissue and having a physical extent, comprising:

three or more electrodes; and

control circuitry connected to the three or more electrodes to control the application of electrical current through the electrodes, the control circuitry capable of conducting an electrical current through the three or more electrodes such that one electrode can function as a current source and one or more of the remaining electrodes can function as a current sink and further capable of switching the function of acting as a current source and as a current sink among the

electrodes.

[c17] 17. The device of claim 16, wherein the control circuitry is further capable of measuring the electrical impedance between the electrode functioning as the current source and the one or more electrodes functioning as current sinks.

[c18] 18. The device of claim 16, wherein one of the electrodes is adapted to be applied to soft tissue remote from the proximate physical extent of the wound.

[c19] 19. The device of claim 16, wherein the control circuitry is capable of measuring an electrical impedance value between the electrode functioning as the current source and the one or more electrodes functioning as current sinks.

[c20] 20. The device of claim 16, wherein the control circuitry is capable of conducting both a pulsital AC current, and a DC current.

[c21] 21. A device for promoting the healing of a wound disposed in soft tissue and having a physical extent, comprising:

three or more electrodes;

means for conducting electrical current through the electrodes, connected to the three or more elec-

trodes;

means for causing one of the electrodes to function as a current source and one or more of the remaining electrodes to function as a current sink, connected to conducting means; and

means for switching the function of acting as a current source and as a current sink among the electrodes, connected to the causing means.

[c22] 22. A method of promoting the healing of a wound disposed in soft tissue and having a physical extent, comprising applying electrical stimulation as a function of electrical impedance measurement.

[c23] 23. The method of claim 22, where the electrical stimulation is an AC sine wave with about 250 microsecond pulse width and current of about -10 ma when the impedance is between about 3.7 to about 4.1 ohms per cm of tissue, and the electrical stimulation is an AC sine wave with about 250 microsecond pulse width and current of about -5 ma when the impedance is between about 4.8 and about 5.1 ohms per cm of tissue.

[c24] 24. A method of promoting the healing of a wound disposed in soft tissue and having a physical extent and phase of healing, comprising determining the phase of healing and applying electrical stimulation as a function

of the phase of healing.

[c25] 25. The method of claim 24, the physical extent comprising a plurality of wound areas, further comprising determining the phase of healing in each of the plurality of wound areas, and applying electrical stimulation in each of the wound areas as a function of the phase of healing of that wound area.

[c26] 26. The method of claim 24, where the electrical stimulation comprises a sine wave having between about 220 microsecond and about 250 microsecond pulse width.

[c27] 27. The method of claim 24, where the electrical stimulation comprises a sine wave having between 100 microsecond and 1000 microsecond pulse width.

[c28] 28. A computer readable medium containing program instructions sufficient to cause a user computer to operate control circuitry to determine the phase of healing of a wound disposed in soft tissue and apply electrical stimulation as a function of the phase of healing.

[c29] 29. A system for promoting the healing of a wound disposed in soft tissue and having a physical extent and phase of healing, comprising:

a user computer system including computer readable memory,

three or more electrodes;

control circuitry connected to the three or more electrodes and the user computer to control the application of electrical current through the electrodes, the control circuitry capable of

conducting an electrical current through the three or more electrodes such that one electrode can function as a current source and one or more of the remaining electrodes can function as a current sink, and

measuring an electrical impedance value between the electrode functioning as the current source and the one or more electrodes functioning as current sinks; and

a computer readable medium containing program instructions sufficient to cause the user computer to operate the control circuitry to determine the phase of healing of a wound disposed in soft tissue and apply electrical stimulation as a function of the phase of healing.

[c30] 30. The system of claim 29, the physical extent comprising a plurality of wound areas, the program instructions further sufficient to cause the user computer to operate the control circuitry to determine the phase of healing in each of the plurality of wound areas, and apply electrical stimulation in each of the wound areas as a function of

the phase of healing of that wound area.

[c31] 31. The system of claim 29, where the electrical stimulation comprises a sine wave having between about 220 microsecond and about 250 microsecond pulse width.

[c32] 32. The system of claim 29, where the electrical stimulation comprises a sine wave having between 100 microsecond and 1000 microsecond pulse width.